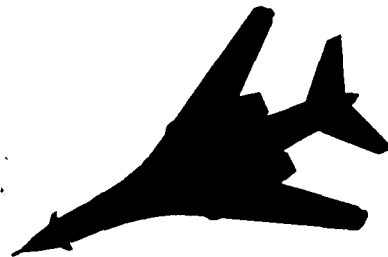
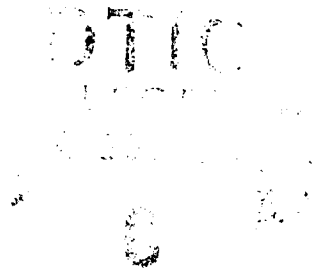




AIR FORCE OPERATIONAL TEST AND EVALUATION CENTER
(AFOTEC)



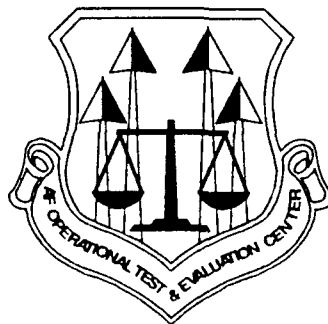
AN INTRODUCTION TO
OPERATIONAL TESTING AND
AFOTEC

MISSION, HISTORY, AND POLICY



EDITION 2.0

- JULY 1991 -



Prepared by Lawrence R. Benson
Director of Research Services
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91-07237



DESCRIPTION OF AFOTEC'S EMBLEM

AFOTEC's official emblem was designed in 1974 based upon the new Center's responsibilities and the roles and missions of the United States Air Force as outlined in the contemporary edition of AFM 1-1. The emblem's heraldry features four blue and gold "deltoids." They appear as a flight of delta wing aircraft leaving white contrails against a blue sky. Each of the deltoids has a symbolic meaning, representing four fundamental military objectives of the United States: to deter aggression, to resolve conflicts on favorable terms, to achieve national objectives, and to promote a secure international environment. The blue and gold deltoid color scheme subdivides these four fundamental objectives into eight of the specified missions and tasks of the United States Air Force: (1) strategic aerospace, (2) counterair, (3) air interdiction, (4) close air support, (5) aerospace defense, (6) reconnaissance, (7) electronic warfare, and (8) airlift. The white contrails signify the test and evaluation process, which follows the concept formulation, validation, and development of systems and equipment. The red scales in the foreground portray AFOTEC's impartial and independent assessment of system performance as weighed against the Air Force's tasks and missions.

The silhouettes on the cover depict four aircraft that AFOTEC has tested extensively during its history: the E-3 Sentry, B-1 Lancer, F-15 Eagle, and F-16 Falcon.

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PREFACE

During the past 20 years, Operational Test and Evaluation (OT&E) has become a critical part of acquisition programs and, as such, has often been a topic of considerable interest for Department of Defense decision makers, members of Congress, the defense industry, and the media. This publication is primarily intended to serve as a compact reference for people involved with Air Force test and evaluation, especially those not already familiar with the details of OT&E. It summarizes the policy and procedures governing OT&E and describes the mission and roles of AFOTEC as the manager of Air Force operational testing. The narrative briefly recounts the evolution of operational testing within the Air Force, portrays the development of AFOTEC, and outlines the structure and responsibilities of other related Air Force and Department of Defense organizations. The appendices list AFOTEC commanders and vice commanders and the systems that AFOTEC has tested, highlighting those that contributed to Operation Desert Storm. The booklet ends with a glossary of the abbreviations and acronyms that are so pervasive in the test and evaluation business. For details on policy and procedures, the reader should consult the appropriate Department of Defense and service directives--many of which are cited in the list of notes.

This edition updates and expands on a previous version of June 1990, which is now obsolete and should be discarded. In attempting to cover the full scope of operational testing in a limited number of pages, it may contain some gaps and discrepancies. The undersigned is fully responsible for errors of fact or interpretation. OT&E policy is constantly evolving, and the organization of the Air Force and the other services is rapidly changing in the early 1990s, so some of the information provided may quickly become dated. Please forward any corrections, suggestions, updates, or additional information to HQ AFOTEC/RS, Kirtland AFB, NM 87117-7001 (DSN 246-5341) for incorporation in the next edition.



LAWRENCE R. BENSON
Director of Research Services



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AN INTRODUCTION TO OPERATIONAL TESTING AND AFOTEC: MISSION, HISTORY, AND POLICY

The Air Force Operational Test and Evaluation Center (AFOTEC) performs an influential role as the Air Force's principal organization for operational test and evaluation (OT&E). In addition to testing most of the Air Force's primary weapons and other systems, AFOTEC helps formulate policy and provides guidance to the Air Force's major commands (MAJCOMs) in conducting their OT&E programs.¹ The Center's most important goal is to ensure systems will perform well in combat or other operational environments. The diverse functions performed by AFOTEC focus on providing credible information to the Air Force and Department of Defense (DoD).

In accordance with DoD policy, AFOTEC is an operational test agency (OTA) aligned independently from the organizations that develop, procure, and use the equipment tested.² The operational units which will employ this equipment in the field are AFOTEC's ultimate and most important customers. Other often more immediate customers include decision-makers in the acquisition process who rely on OT&E findings at various program milestones. The AFOTEC commander (see Appendix 1 for a list) reports to the Chief of Staff of the Air Force (CSAF). On 5 February 1991 the Air Force changed the organizational status of AFOTEC from a separate operating agency to a direct reporting unit.³

Since its establishment in 1974, AFOTEC has completed more than 150 major OT&E programs and numerous other projects involving a wide variety of weapons and other equipment (see Appendix 2). As a result, the Center has tested most of the major systems developed by the Air Force since the end of the war in Southeast Asia--many of which proved highly effective in Operation Desert Storm. The Air Force has recognized AFOTEC and attached

personnel by selecting the Center for three organizational excellence awards for its achievements and contributions.

Key Definitions

Within DoD, test and evaluation (T&E) encompass a wide range of activities, broadly categorized as development test and evaluation (DT&E) and operational test and evaluation (OT&E). Although either type of T&E may occur at any point in the life cycle of a system, DT&E usually begins earlier (often in the laboratory) and focuses on engineering analysis and technical compliance with contract specifications in a controlled environment, e.g., classic flight testing. DT&E also includes Live Fire Testing (LFT) to examine the vulnerability of many weapon systems and the lethality of munitions. OT&E traditionally starts later than DT&E and focuses on the overall performance of a system in its intended environment.

OT&E. By law (Title 10 of the US Code) operational test and evaluation is defined as "the field test, under realistic combat conditions, of any item of (or key component of) weapons, equipment, or munitions for the purpose of determining the effectiveness and suitability [of these items] for use in combat by typical military users; and the evaluation of the results of such test."⁴ Operational effectiveness primarily concerns how systems perform when employed, while operational suitability involves how well they can be kept available for use. The findings of OT&E contribute to decisions on the acquisition of new systems, improvements to systems already being produced, modifications of systems deployed in the field, and other aspects of their operational capabilities. OT&E has several sub-categories and related activities, such as assessments, that

broadly correlate to the maturity of the system being examined.

IOT&E. Prototypes and preproduction hardware funded by research, development, test and evaluation (RDT&E) appropriations receive initial OT&E (IOT&E). The most common purpose of IOT&E is to provide a valid estimate of effectiveness and suitability in support of acquisition decisions, especially for full rate production at Milestone III (see Table 1). For low volume or one-of-a-kind systems, such as satellites and command centers, IOT&E supports turnover decisions from the developing to the operating command. Within the Air Force, IOT&E normally overlaps with DT&E and uses many of the same resources; however, IOT&E is conducted by typical operational and maintenance personnel rather than specialists such as test pilots and contractor technicians. IOT&E concludes with a dedicated phase of testing using production or production-representative articles.

FOT&E. After a system enters production, it usually undergoes follow-on OT&E (FOT&E). Phase 1 of the FOT&E refines IOT&E estimates and assesses the capability of the full system and the need for modifications by verifying changes made since previous testing and examining field performance, employment, and support. Phase 2--which the operating command may conduct as needed--updates effectiveness and suitability data, supports tactics development and valuation (TD&E), confirms training requirements, contributes to refinement of doctrine, and identifies deficiencies and the need for any further modifications.

QOT&E. An Air Force system that does not require new R&D--such as an existing system given a new mission or modified to improve capabilities--receives a qualification OT&E (QOT&E), which is similar in certain

aspects to an IOT&E. Likewise, qualification test and evaluation (QT&E) resembles DT&E. The Air Force formally defined qualification testing in 1980.

EOA/OA. To help reduce risk in early acquisition decisions, DoD has called upon its operational test agencies to examine systems before there is production-representative hardware to test. When this activity occurs during the concept exploration phase (for a Milestone I decision) or the demonstration and validation stage (for a Milestone II full-scale development (FSD) decision), it is known as an early operational assessment (EOA). When it supports a low rate initial production (LRIP) or similar decision prior to Milestone III, it is called an operational assessment (OA). The main objectives of these assessments are to improve planning by highlighting program documentation status and the readiness of a system for IOT&E, appraise the significance of programmatic voids and early testing trends, and conduct special field tests or simulations as directed by higher headquarters.⁵

MST&E. When two or more services (or federal agencies) test a system to be acquired by each or interoperable among them, it is considered a multiservice test and evaluation (MST&E). In these cases, a lead service or agency is normally appointed to conduct the test according to its regulations and an appropriate memorandum of agreement (MOA). For multiservice OT&E (MOT&E), the four OTAs follow an umbrella MOA.⁶

JT&E. Joint test and evaluation (JT&E) programs also involves two or more of the services. As a rule, however, they are administered and largely funded by OSD as a separate category of testing, either operational or developmental in emphasis, but that does not support formal acquisition decisions.⁷

OUEs and Demos. Although undefined in any official Air Force directive, operational utility evaluations (OUEs) have periodically been conducted to meet a specific purpose directed by higher headquarters. They normally estimate how well a future system might satisfy user requirements if it performs as advertised. Because of their early timing in the acquisition process, OUEs usually rely heavily on modeling and simulation. On other occasions when hardware is available, OTAs conduct restricted tests, characterized as demonstrations ("demos"), to show how the existing equipment performs certain functions.⁸

Program Milestones and the Acquisition Process

Many of the activities defined above support various milestones (MSs) in the defense acquisition cycle. The structure of this process underwent a major revision with release of DoD Directive 5000.1 and Instruction 5000.2 in February 1991. Table 1 below shows the relationship between the old and new definitions. So that the decision-makers can better manage risk, the new philosophy emphasizes exit criteria at each milestone--with operational assessments and evaluations being key indicators.⁹

Milestone & Phase Numbers	Previous Milestone Definitions	Current Milestone Definitions	Phase Definitions	OT&E Activity
- Ongoing	----->		Determination of Mission Need	
MS 0	Program Initiation & Mission Need Decision	Concept Studies Approval		
- Phase 0	----->		Concept Exploration & Definition	OUE EOA
MS I	Concept Demonstration/Validation Decision	Concept Demonstration Approval		
- Phase I	----->		Demonstration & Validation (DEMVAL)	OUE EOA
MS II	Full Scale Development Decision	Development Approval		
- Phase II	----->		Engineering & Manufacturing Development	OA IOT&E
MS IIIA*	Low Rate Initial Production (LRIP) Decision			IOT&E
MS III	Full Rate Production Decision	Production Approval		
- Phase III	----->		Production & Deployment	FOT&E
MS IV	Logistics Readiness & Support Review	Major Modification Approval (as required)		
- Phase IV	----->		Operations & Support	FOT&E
MS V	Major Upgrade or System Replacement Decision	None		

*used but not formally designated.

Table 1. OT&E and the Acquisition Cycle (Old and New)

The Defense Acquisition Board (DAB) is DoD's main decision-making body for major programs. It is successor to the Defense Systems Acquisition Review Council (DSARC), which performed a similar role from 1969-1986. Membership on the DAB includes the following high level officials: the Undersecretary of Defense for Acquisition and deputy; the Vice Chairman of the Joint Chiefs of Staff (JCS); the Director of Operational Test and Evaluation (DOT&E); the Director of Defense Research and Engineering (DDR&E); the Assistant Secretary of Defense for Program Analysis and Evaluation (DPA&E); the DoD Comptroller; and the service acquisition executives (SAEs).

After streamlining of its supporting structure, the DAB in 1991 includes three committees: the Conventional Systems Committee (CSC), the Strategic Systems Committee (SSC), and the Command, Control, Communications and Intelligence (C³I) Systems Committee. Each of these committees has 18-20 permanent members.¹⁰

The Air Force Systems Acquisition Review Council (AFSARC) has decision authority for generally smaller USAF programs than the DAB, but it follows similar milestones.

OT&E Management

Since its early years AFOTEC has developed and refined a systematic process for managing the OT&E mission. The Center focuses on three main levels of effort with respect to test programs: conducting, monitoring, or maintaining cognizance. This process evolved rapidly at the end of the 1980s, with many of the changes documented in the Center's operations guidance (AFOTEC Regulation 55-1).¹¹ In late 1989 AFOTEC's long quest to establish consistent guidance for OT&E on an Air Force-wide basis culminated with an "implementable draft" of a revised AFR 55-43, "Management of Operational Test and Evaluation," which was

formally published in June 1990.¹² In April 1991 the Center replaced its internal 55-1 regulation with an AFOTEC Supplement to AFR 55-43.¹³

Program Identification. Normally AFOTEC conducts the IOT&E of those programs that: will cost at least \$200 million in fiscal year (FY) 1980 dollars for RDT&E; will require at least \$1 billion (in FY80 dollars) for procurement; are on the Selected Acquisition Report (SAR) list; are on the OSD oversight list; and/or present complex or sensitive challenges, such as extensive multi-service testing. These include the majority of Air Force programs in DoD Acquisition Category (ACAT) I, which include those costing at least \$300 million in RDT&E or \$1.5 billion in total procurement (FY90 dollars).

Advance Planning. Since the late 1970s, AFOTEC has endeavored to begin preparing for OT&E ever earlier in the acquisition process. Within the headquarters, primary responsibility for screening programs to be managed by AFOTEC belongs to the Directorate of Plans and Policy (AFOTEC/XP). Prior to Milestone 0, XP coordinates staff comments on using commands' mission need statements (MNS, formerly statement of operational need or SON) and reviews new acquisition programs for testing responsibilities.

As a program reaches Milestone 1, the Center becomes increasingly involved. Members participate on the test planning working groups (TPWGs), and the staff reviews and makes significant inputs to such key documents as the operational requirements document (ORD, formerly the system operational requirements document or SORD), the systems threat analysis report (STAR), program management directive (PMD), and test and evaluation master plan (TEMP). Starting in 1990, OSD also began to emphasize the importance of the cost and operational effectiveness analysis (COEA) at this stage.

Matrix Structure. To prepare for and manage most OT&E programs, AFOTEC relies on a matrix system of representatives from throughout the headquarters known as a Test Support Group (TSG). The TSG is chaired by the responsible test manager, who at first is normally assigned to XP. Since 1989 the Center has followed a carefully structured Test Planning Review (TPR) process to ensure a consistent and comprehensive examination of the program by the headquarters staff as the TSG builds an increasingly detailed test concept and expands it into a test plan. In a related aspect of the planning effort, the Directorate of Resource Management (RM) publishes and updates a Test Program Outline (TPO) identifying the needed funding, personnel, equipment, and facilities.¹⁴ Certain highly technical tasks may be identified for performance as subtasks under one of AFOTEC's general support or technical support contracts. Completion of advance planning is marked by the transfer of a program and its test manager from XP to the Directorate of Test and Evaluation (TE). Some short notice tests or those transferred from a MAJCOM are assigned directly to TE without an advance planning phase.

The Directorates of Analysis (OA) and Logistics (LG) provide broad expertise in determining operational effectiveness and suitability, while other offices, such as Systems Safety, Security, and Weather provide assistance as required.¹⁵ Since 1987, highly classified programs with special access required (SAR), such as the B-2, have been completely managed within the Directorate of Special Test (ST). In 1990 a provisional organization for range matters became the Directorate of Test Capability (CR) to provide expertise on threat systems, range resources, and related matters.¹⁶

Test Planning. Continuing to use the TSG, the test manager completes the test plan. It covers all

aspects of the coming OT&E effort, including resources, support, schedule, and limitations. Among the key evaluation elements identified are the following:

- critical operational issues (COIs), the system characteristics of particular importance to decision makers;
- test objectives, which break down COIs into clearly defined tasks or areas to be examined;
- measures of effectiveness (MOEs), a quantitative or qualitative measure of a system's performance under specified conditions; and
- evaluation criteria, the "yardsticks" to appraise results against requirements.¹⁷

Test Execution. At least nine months before a scheduled start date, AFOTEC's test director is normally assigned to the main test location and begins to build a test team to conduct the OT&E. If the test team is not colocated with one of AFOTEC's detachments, the headquarters designates it as an operating location (OL).

In most IOT&E programs, AFOTEC's team shares resources with a previously-established DT&E team as part of a combined test force (CTF). Led by the Responsible Test Organization (RTO), the CTF also can include representatives of the System Program Office (SPO) and the contractor. In cases of multiservice OT&E, the participating services' OTAs often establish a joint test organization under the designated lead service's test director.

In any case, the OT&E team processes and interprets test data with complete independence from its DT&E counterparts. And, after certification of readiness by the developing agency, the OT&E concludes with dedicated operational testing.

In almost all OT&Es, an operational MAJCOM loans AFOTEC the bulk

of the personnel and equipment needed to conduct the test. Air Training Command (ATC) and Air Force Logistics Command (AFLC) usually augment the team with specialists. To help determine operational suitability through use of a common data system, a Joint Reliability and Maintainability Evaluation Team (JRMET) may also be formed. Test teams also submit "service reports" (sometimes numbering in the thousands) to identify deficiencies discovered in testing and recommend enhancements, with the higher priority service reports implemented as soon as possible.¹⁸

Many of the personnel who take part in the OT&E later become available to help the MAJCOM in the "beddown" and initial operational capability (IOC) of the system.

Limitations. Every major test is limited by resource and safety constraints (e.g., the impracticality of replicating actual warfare). Beyond these inherent limitations, AFOTEC attempts to test as realistically as practical, but historically has faced various limiting factors. Some of the most common have been inadequate threat systems, airspace restrictions, less than optimal instrumentation, not enough primary test articles or support equipment, the system tested not being production-representative, use of immature software, fewer test events than desired, not enough maintenance data, and inadequate documentation.¹⁹

Starting in 1984, AFOTEC took the lead in trying to solve many of DoD's longstanding test range and threat limitations by initiating the statement of need and managing a program to establish an Electronic Combat Test Capability (ECTC). As the program evolved, the ECTC would have upgraded the Utah Test and Training Range to provide an integrated air defense threat.²⁰ Cuts in the defense budget resulted cancellation of the ECTC in early 1990, but AFOTEC continues to

work actively for improved test capabilities and resources.

Analysis. The main focus of most test activities is the generation of data (e.g., statistics, telemetry, visual documentation, and questionnaires). To find trends and draw valid conclusions requires AFOTEC to collect data from as many sources or perspectives as practical, reduce them to a useable volume while reviewing for consistency and discrepancies (e.g., "outlying data"), and examine the reduced data with specific objectives in mind (e.g., MOEs). For tests involving large amounts of data, team analysts and HQ AFOTEC--augmented by support contractors--use automated data reduction and analysis packages to help "crunch" the numbers.

<u>Effectiveness</u>	<u>Suitability</u>
Security	Reliability
Vulnerability	Transportability
Susceptibility	Compatibility
Survivability	Maintainability
Interoperability	Supportability
Capability	Availability

Table 2. Some Attributes of Effectiveness and Suitability

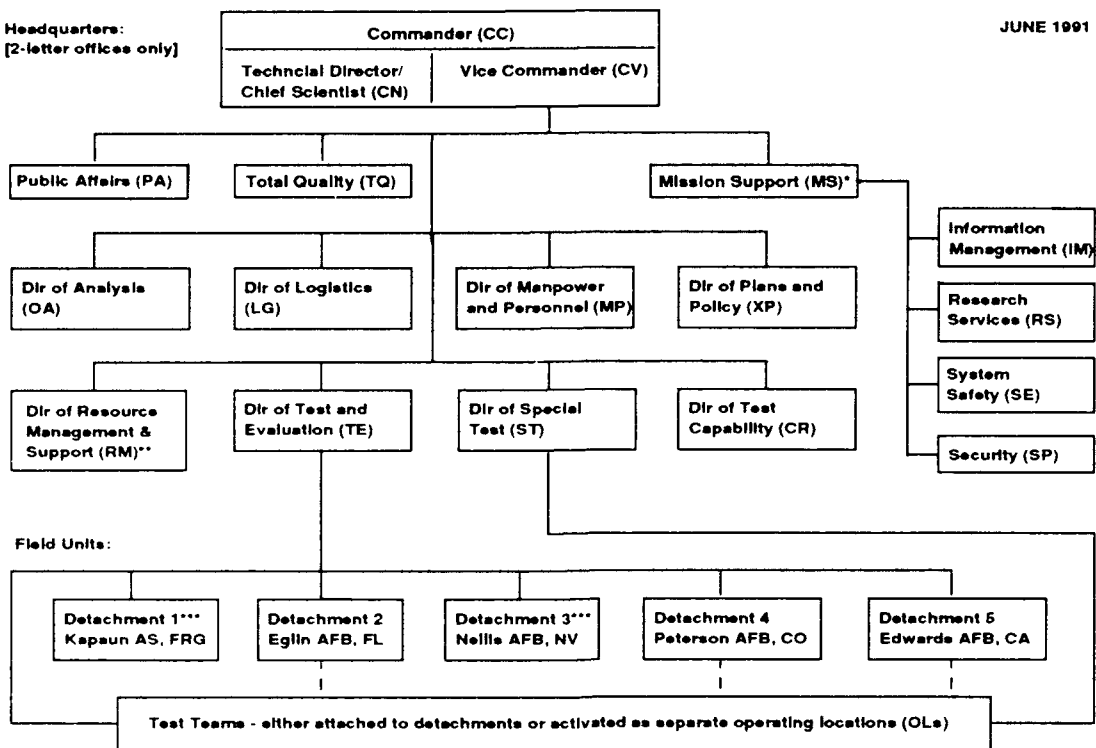
As shown in the table above, these analyses address the "ilities" of the system, with operations analysts trying to answer the question "is it capable?" and logistics analysts the question "will it be available?" In the increasingly important field of software suitability, AFOTEC's logistics analysts are among the nation's acknowledged experts.²¹

Modeling and Simulation. Supported by an expanding Communications-Computer Systems Division (SC), the Directorates of Analysis and Logistics built up considerable experience in modeling and simulation (both

AIR FORCE OPERATIONAL TEST AND EVALUATION CENTER

Headquarters:
[2-letter offices only]

JUNE 1991



ATTACHED TO HQS: Elements of AF Intelligence Agency, AF Electronic Warfare Center, Air Weather Service, Aerospace Audio-Visual Service, HQ Air Force Logistics Command, HQ Tactical Air Command

NOTES: *Dual-hatted as Headquarters Squadron Section Commander (CCQ)

**Includes Comptroller (AC), Engineering/Facilities (DE), and Communications/Computer Systems (SC) functions

***To be replaced by OLs on 30 September 1991

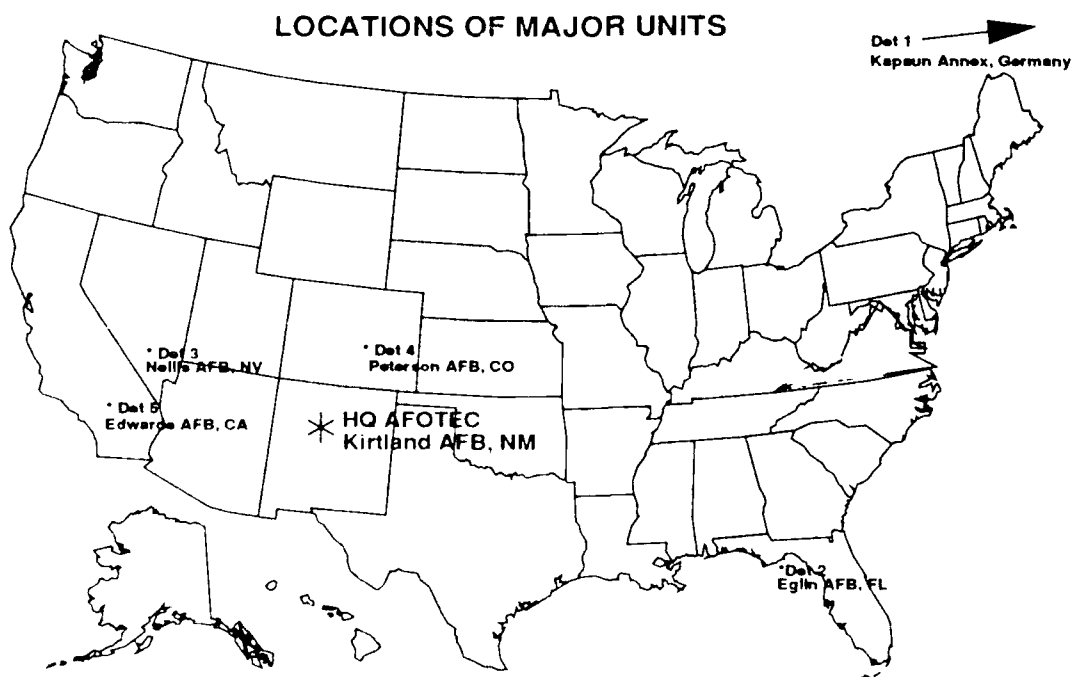


Figure 1. Organization and Locations

digital and hybrid or "man-in-the-loop") during the 1980s. AFOTEC developed its own computer models as well as using other DoD facilities and the expertise available through technical support contracts. The use of modeling and simulation can be especially valuable during EOAs and OUEs.

Although noted for its expertise in this area, the Center has always followed a firm policy that modeling and simulation can supplement but never substitute for actual testing.²² One of the functions of the Modeling Division in the recently created Directorate of Test Capability is to expand AFOTEC's in-house modeling resources.

Reporting. AFOTEC's most important product is not necessarily testing or analysis per se; rather it is the information contained in briefings presented and reports published on the results. In addition to end-of-test briefings and detailed final reports, lengthy test programs often require interim summary reports as well as periodic briefings and other assessments. These are given to a wide range of officials and organizations, such as SPOs, Program Executive Officers (PEOs), MAJCOMs, the Air Staff, other OTAs, and DOT&E. The briefings also go to various formal groups, up to and including the AFSARC and committees of the DAB.²³

In its early years, AFOTEC's reports often directly recommended producing or not producing the system tested. After this practice ended in the early 1980s, OT&E reports continued to assign Inspector General-style rating terms, such as "outstanding," "satisfactory," "marginal, and "unsatisfactory." Use of these judgmental words, however, tended to overshadow the reports' more detailed findings in the minds of decision-makers. Beginning in 1988, AFOTEC dropped use of such terms and began stating its evaluation results strictly on whether systems met or did not meet user requirements or criteria.

The decision-makers then must weigh the OT&E results with other factors, such as the system's potential for improvement, past contractor performance, budgetary constraints, current force structure needs, the latest threat projections, alternative solutions, and economic or political realities.

After termination of an OT&E program, the final report and other key documents are preserved as permanent historical documentation on the procedures and findings of the OT&E. AFOTEC also maintains an OT&E Lessons Learned database of suggestions submitted by test teams and personnel at the headquarters.²⁴

Air Force OT&E Before AFOTEC

How did this elaborate system of operational testing come into being? In essence, Air Force OT&E and DT&E date back to one of the Wright Brothers' early flying machines in 1909, when the Chief of the Army Signal Corps issued the following test directive to 1Lt Benjamin Foulois: "Your orders are simple, lieutenant. You are to evaluate the airplane. Just take plenty of spare parts and teach yourself to fly." Foulois soon improved the operational effectiveness of the aircraft by adding a seat, safety belt, and landing gear. To put the current mission and role of AFOTEC and its relationship to other Air Force organizations in perspective, a brief look at Air Force operational testing since the Second World War is necessary.²⁵

Air Proving Ground, 1941-57.

Six months before Pearl Harbor, in May 1941, the Army Air Forces created the Air Proving Ground to test new aircraft in their operational roles. Like AFOTEC, it was an independent organization reporting directly to the Chief of Staff. After significant contributions during World War II, Air Proving Ground Command (APGC) became one of the early MAJCOMs of the new United

States Air Force in 1948. During the 1950s, APGC grew to include 12,000 personnel and its own "Air Force in miniature" consisting of almost every aircraft and missile then in the inventory.

In addition to performing operational suitability tests (as OT&E was then known) on new weapon systems, APGC tested them for environmental factors and helped develop new tactics and training for their employment. It also staged impressive firepower demonstrations. The command probably grew too big for its own good, and the Air Force--facing large budget cuts in 1957--abolished APGC as a MAJCOM and merged what was left into a test center of the Air Research and Development Command (ARDC), which became Air Force Systems Command (AFSC) in 1961.

Why did the Air Force do away with its first independent operational test agency? The official answer was that "the changing technology of war"--with missiles replacing bullets--and the need for more timely production had made operational testing obsolete.²⁶

Part of the underlying reason for the demise of APGC may be found in the multi-phase T&E process of the time. The first six of these phases emphasized engineering factors, contract compliance, and the functioning of equipment. Not until operational suitability testing (Phase VII) did the Proving Ground get a chance to see how a weapon worked under operational conditions. In 1956 the Air Force added Phase VIII, "unit operational employment testing," conducted by the using commands. By the time APGC and the MAJCOMs had a chance to assess a system, it had usually already entered production. Although operational testing could help in the system's employment and support, it seemed to contribute relatively little to the acquisition process.

Streamlined T&E, 1958-64. To shorten the time needed to get ever

more sophisticated systems from design to deployment, ARDC had devised the "weapon-system concept." Reflecting this philosophy, ARDC was expanded to create Air Force Systems Command in 1961. For maximum efficiency, this management approach featured a high degree of concurrent development, testing, production, and preparations for support. The condensed T&E schedule and the Air Force's growing emphasis on missiles and nuclear weapons, even in the tactical air forces, called into question the validity of traditional operational testing. In view of these changes, the highly visible Air Proving Ground Command was seen as a costly and redundant function.

In conjunction with APGC's demise, the Air Force streamlined the T&E process from eight categories of testing to only three. Categories I and II, performed by the contractor and AFSC, were equivalent to today's DT&E. Category III, performed by the MAJCOMs, was similar to today's FOT&E. Overall, Air Force T&E was the most formal and structured of the four services' programs.

The Air Force OT&E function, however, had become procedural rather than organizational. Even the office on the Air Staff that had interfaced with APGC since 1948 was abolished, so there was no central operational testing advocate to maintain a corporate memory or to balance the interests of the developer and user. Within the scope of this decentralized system, the MAJCOMs did perform some highly professional OT&E. These tests, however, still usually occurred far too late to affect equipment design. Instead, the implementation of OT&E findings often required costly retrofits, modifications, and various "work-arounds" in the field.

Growing concern with this situation led the Air Staff to form a Weapons Effectiveness Testing Task Force in December 1964. This interim body was replaced by a new deputy to

the DCS for Plans and Operations in 1965. A brigadier general, this deputy (whose office grew to over 60 people) provided the Air Force with centralized OT&E guidance for the next decade.

New Focus on OT&E, 1965-73.

The war in Vietnam presented American weapon systems with unexpected challenges, ranging from primitive anti-guerilla tactics to rapidly evolving electronic warfare capabilities. The hot and humid jungle environment also took its toll. Problems in employment and maintenance, which might have been corrected with earlier OT&E, had to be dealt with at great cost in the field. Combat evaluations, such as the highly-publicized Combat Lancer deployment of F-111As to Thailand in 1968, sometimes proved risky.

Problems affected all the armed services. In a sample of 22 weapon systems deployed to Southeast Asia from 1965-1970, Department of Defense studies found all but one had suffered deficiencies in combat. Some placed blame on the fact that only three of these weapons had undergone OT&E prior to production decisions.

As the result of such findings and other embarrassing problems with performance and cost overruns on new systems, such as the C-5A, the potential benefits of OT&E became the focus of much attention. The acquisition of fewer but more complex and expensive systems with longer service lives was allowing less room for mistakes than in the past.

Starting in 1969 with formation of the DSARC, DoD began looking at how OT&E could better contribute to procurement decisions. There was a growing perception within DoD and Congress that both the developing and operating commands had too much of a stake in the success of major acquisition programs to be trusted with doing all of the testing.

The pressure on the Air Force to reorganize its OT&E function gained

momentum in the early 1970s. A Presidential Blue Ribbon Panel recommended on 1 July 1970 that there be an OT&E organization, independent of the developer and user, reporting directly to the chief of each service. Deputy Secretary of Defense David Packard repeated this recommendation in a memorandum on 11 February 1971. In April 1971 the Deputy Secretary of Defense introduced the idea of "initial operational test and evaluation" (IOT&E) of new systems to assist in acquisition decisions. Public Law 92-156, passed by Congress on 17 November 1971, required submission of OT&E data before weapons procurement. In December 1972 the Commission on Government Procurement recommended that OT&E start as early as possible in major system acquisitions and be conducted by an activity separate from developer and user organizations. As described later, the Army and Navy quickly complied.

AFOTEC's Creation and Development, 1973-91

Charter. The Air Force, which unlike the other services had a large office at the Pentagon for overseeing OT&E, did not respond promptly to these calls and create a separate operational test agency in the field. This delay was criticized by the General Accounting Office (GAO) in a report published in March 1973. On 11 December 1973, after more studies and intense MAJCOM and Air Staff deliberation, Gen George S. Brown, CSAF (and a former commander of AFSC), approved the establishment of the Air Force Test and Evaluation Center (AFTEC).

To help assure "complete objectivity," AFTEC was to be "independent of those Air Force commands which develop, procure, and use Air Force weapons and subsystems."²⁷ The Air Staff office was reduced in scope to become the forerunner of an OT&E

Division (later XOORE, XOOST, and XORT). AFTEC was renamed AFOTEC in April 1983 when the word "operational" was added to more clearly delineate its mission and avoid any confusion with DT&E organizations.

Establishment. The first people assigned to AFOTEC "hit the ground running." The Center was activated on 1 January 1974 at Kirtland AFB, NM. Kirtland was already site of the Air Force T&E Systems Program Office (TESPO), which was developing a vast Continental Operating Range for TAC. (AFTEC was slated eventually to operate the COR, but the project was not funded by Congress and the TESPO was soon disbanded.) The Center achieved initial operational capability in April 1974, and became fully operational in October 1974. By year's end it was managing 32 OT&E programs, acting as lead agency on two DoD-sponsored JT&E programs, and monitoring 103 operational tests being conducted by the MAJCOMs.

Organization. Unlike the large and cumbersome Air Proving Ground Command, AFOTEC was designed with a small management headquarters that would borrow most of the equipment, personnel, and facilities needed for field testing from the developing and operating commands. The operating commands also continued to conduct the vast majority of programs and retained full responsibility for tactics development and evaluation.

Size. As its workload of programs and other responsibilities grew during the next decade, AFOTEC expanded to over 700 personnel in the headquarters and field. This number remained fairly stable from 1984 through 1990, but as part of the overall downsizing of the post-Cold War Air Force, AFOTEC is planning to reduce to about 500 personnel by 1994. In addition to the people assigned to

AFOTEC, the commander also exercises operational control over a comparable number attached to test teams and provides guidance to well over 2,000 personnel involved in operational testing by the MAJCOMs.²⁸

Field Units. To help in administering its field activities, AFOTEC has established Detachments (Dets) at several locations (see map in Figure 1).

- Det 1, at Kapaun AS, Germany, was activated in June 1977 to provide liaison with United States Air Forces in Europe (USAFE) and other European organizations. As part of the drawdown mentioned above, Det 1 will become OL-RC on 30 September 1991.

- Det 2, at Eglin AFB, FL, was activated in August 1977. It has worked closely with local AFSC and Tactical Air Command organizations at this major T&E complex, such as the Tactical Air Warfare Center (TAWC) and the former Armanent Division. Det 2 has supported numerous teams, most involved with munitions and electronic combat.

- Det 3, at Nellis AFB, NV, was activated in April 1978 to interface with the Tactical Fighter Weapons Center (TFWC) and other organizations at the Nellis range complex. It will be reduced to OL-TF on 30 September 1991.

- Det 4, which in the early 1980s had been used as the designation of a classified unit working on the mobile MX missile program, was reactivated in Colorado Springs in February 1984 to support space-related test teams and serve as AFOTEC's liaison with US and Air Force Space Commands as well as the North American Air Defense Command (NORAD). Det 4 later moved on Peterson AFB.

- Det 5, at Edwards AFB, CA, was activated in July 1982 to serve mainly as

the parent organization for the numerous aircraft and missile test teams that have been working at the Air Force Flight Test Center (AFFTC) since AFOTEC's earliest days.²⁹

Commanders and Policies.

Although the evolution of OT&E policy and procedures has been strongly influenced by outside factors, most of the past commanders of AFOTEC have left their mark as well. They have also helped shape the Center's philosophy, mission, and mode of operation.

- 1974-76. With four commanders in the first three years (see Appendix 1), AFTEC devoted most of its attention to starting and conducting tests--many of which had first been planned before its formation--and asserting its basic authority and independence in the face of reluctant acquisition and T&E communities. Revisions of AFR 23-36 (AFTEC's mission regulation) and AFR 80-14 (T&E) in July 1976 helped give the new Center more clout.

- 1976-80. Largely because of the difficulty in gaining MAJCOM coordination, it took three more years to publish AFM 55-43 on OT&E management, which--although not a firm directive--provided AF-wide guidance. A revised AFR 57-1 on operational requirements, also published in June 1979, formalized AFTEC's review of documentation on proposed new systems. Under Maj Gen Howard W. Leaf, who commanded AFOTEC during this crucial period, the Center almost doubled in size and began more systematic advance planning, threat realism, suitability analysis, modeling and simulation, and software evaluation. In effect, AFTEC assumed the basic structure and established the procedures it has generally followed to this day.

- 1980-82. By the time Maj Gen Wayne E. Whitlatch assumed command in June 1980, AFTEC had reached the

stage of maturity when it was appropriate to do some in-depth self-examination. One year after his arrival General Whitlatch used the results of two major studies of AFTEC's mission and organization to write a comprehensive mission statement compatible with today's strategic planning concepts.

- 1982-85. Under the command of Maj Gen Richard W. Phillips, May 1982 - August 1985, AFOTEC replaced AFM 55-43 with a shorter AFR 55-43, published in June 1985. Although directive in nature, the regulation still allowed considerable leeway to the MAJCOMs in how to plan, conduct, and report OT&E.

- 1985-87. During the tour of Maj Gen Michael D. Hall, who had once headed its AIM-9 test team, the Center updated the official mission statement in AFR 23-36, published in March 1986. The revised regulation spelled out several functions, such as the various elements that comprise operational suitability, not covered in the previous 1980 edition. It also stated AFOTEC's contribution to key acquisition tools such as SONs, program baselines, and the recently established baseline correlation matrix (BCM). As an overall theme during his command, General Hall emphasized making OT&E an "integral part of the acquisition process" and improving relations with developers. He also began holding offsite meetings to encourage fresh looks at the way the Center did business--one result of which was an in-depth Organizational Assessment by a team of outside consultants, published in September 1987.

- 1987-89. Maj Gen Cecil W. Powell, who came to AFOTEC in July 1987 with a broad range of T&E experience and strong backing from the CSAF, emphasized increasing AFOTEC's credibility, especially through better test reporting and standardizing OT&E procedures Air Force-wide. This goal was

largely met with a thorough revision of AFR 55-43 first distributed in September 1989 (and formally published in June 1990). General Powell also stressed early and disciplined planning (resulting in the TPR process), initiated a DoD-wide definition for operational assessments, and took a special interest in improving the requirements process.

- 1990-91. Under Maj Gen Peter D. Robinson, who took command in January 1990, AFOTEC initiated an update of its mission statement in AFR 23-36 to reflect its redesignation as a direct reporting unit (DRU) on 5 February 1991 and other changes. His strong analytical background brought increased attention to the complex processes underlying the measurements of effectiveness and suitability. He also introduced the concept of strategic planning and the philosophy of total quality in the way AFOTEC performed its staff work and served its suppliers and customers --who include both the users of the equipment tested and the decision-makers relying on the Center's reports.³⁰

Programs. During the tours of these commanders, AFOTEC has tested almost every major system fielded by the Air Force during the past 17 years --ranging from aircraft and missiles to communications equipment and satellites (Appendix 2). The Center is currently planning or conducting more than 40 major OT&E programs and helping the MAJCOMs on several hundred others.

Inter-Command Relationships

In addition to leading AFOTEC, its commander exercises operational control over personnel temporarily attached to AFOTEC's test teams and provides policy and guidance to the MAJCOMs in conducting their OT&E programs. Unlike the Army and Navy, the Air Force has large mission area-oriented major commands which write

their own operational requirements, have their own test units, and do their own tactics development. As mentioned in the preceding historical overview, the MAJCOMs have been conducting operational testing since 1956.

MAJCOM OT&E. The operational major commands--especially the Tactical Air Command (TAC), Strategic Air Command (SAC), and Military Airlift Command (MAC)--each conduct a wide variety of OT&E programs on new and modified equipment in their inventories. Except for systems unique to their theaters, USAFE and Pacific Air Forces (PACAF) normally rely on TAC to perform operational testing for all the tactical air forces (TAF).

Other MAJCOMs also manage their own specialized OT&E programs. Air Force Communications Command (AFCC), which has been slated to become a field operating agency (FOA) in 1991, tests communications, air traffic control, and information processing equipment. The Electronic Security Command (ESC)--soon to become the Air Force Intelligence Command--tests cryptographic systems and sensitive intelligence equipment. Air Force Space Command (AFSPACECOM) began conducting OT&E in the mid-1980s, and the recently established Air Force Special Operations Command (AFSOC) took over some test programs from MAC in early 1991.

Besides T&E offices at their headquarters, the MAJCOMs have a number of field units that perform OT&E. The USAF Tactical Air Warfare Center (TAWC) at Eglin AFB conducts most of TAC's OT&E, while the TFWC at Nellis AFB concentrates on TD&E. Within SAC, OT&E activities are divided among the 1st Strategic Air Division at Vandenberg AFB, CA, the 31st Test Squadron at Edwards AFB, CA, the 49th Test Squadron at Barksdale AFB, LA, and the 513th Test Squadron at Offutt AFB, NE. MAC's USAF Airlift Center at Pope AFB, NC, tests

transport aircraft and equipment. The Special Missions Operational Test and Evaluation Center (SMOTEC) located at Hurlburt Field, FL, specializes in systems designed for special operations and low intensity warfare. In July 1991 AFSOC also formed a T&E squadron at Edwards. During late 1990 AFCC began closing its Operational Test and Evaluation Center (OTEC) at Wright-Patterson AFB, OH (formerly the 1815th OT&E Squadron) and established a new Technical Integration Center (TIC) at Scott AFB, IL, to test communications-electronics and information systems equipment.³¹

AFOTEC Oversight. Headquarters AFOTEC and its detachments monitor and advise on the OT&E programs being conducted by the MAJCOMs and their subordinate organizations. Monitored programs are defined as USAF-directed tests involving high risk, high cost, and priority precedence systems. For internal management, AFOTEC designates them as Category 1 programs. On these programs AFOTEC coordinates on the TEMP, approves test plans, and comments on final reports. For smaller and less critical programs, AFOTEC's role is advisory. These OT&Es include USAF-directed (Category 2) or command-initiated (Category 3) projects.

At the end of 1990, AFOTEC listed 127 Category 1, 249 Category 2, and 209 Category 3 programs being conducted by the MAJCOMs.³² AFOTEC planners also use Categories 4, 5, and 6 for tracking conducted, monitored, and cognizance programs projected for the future.³³ To help disseminate its expertise and policy guidance, AFOTEC conducts OT&E training courses attended by many MAJCOM personnel with testing responsibilities.

In May 1991 AFOTEC began taking steps to expand and intensify its role in those MAJCOM-conducted OT&Es of systems assigned to ACATs

I and II--approximately 160 Air Force programs in all.

User Requirements. In addition to reviewing and coordinating on key OT&E documents for monitored programs, AFOTEC works closely with the operating commands in their definition of requirements for new systems. In this role, AFOTEC has become de facto one of the Air Force's chief advocates for improving the requirements process. The revision of AFR 57-1, "Operational Needs, Requirements, and Concepts," in 1988 reflected the Air Force's new emphasis on the importance of requirements. Under the regulation, AFOTEC reviews key documents, works with MAJCOMs in determining COIs, and prepares OT&E criteria for the Requirements Correlation Matrix (RCM).³⁴

Because user requirements provide the basis for measures of effectiveness and suitability, AFOTEC has long recognized their importance and urged users to define them in reasonable and, if possible, testable terms.³⁵ The growing emphasis on improving requirements was highlighted by the practice of holding periodic major program reviews (4-star summits), which began with the B-1B program in August 1989.³⁶

During 1991 the Air Force continued work on revising AFR 57-1 to make it compatible with the new DoD 5000 series directives. The final version of the DoD Instruction 5000.2, distributed in late May 1991, specifies the Cost and Operational Effectiveness Analysis (COEA) as the main tool for determining COIs.

Test Resources. Based on AFOTEC's initiative, the Air Staff formalized the Operational Resources Management Assessment System (ORMAS) in 1980. The main ORMAS body was renamed the OT&E Steering Committee (OSC) in 1991. This group, which traditionally had met twice each year, serves as the Air Force's major

vehicle for budgeting and programming OT&E funds, test assets, range and simulation facilities, and personnel support.

Since the late 1980s, several DoD-wide initiatives have been underway to improve T&E investments. Even so, availability of resources results in frequent test limitations for AFOTEC as well as the other services' operational test agencies. In view of this, AFOTEC also serves as a chief advocate for improving test ranges, threat systems, and other related facilities and equipment.³⁷

Budgeting for Air Force IOT&E underwent a major change starting in FY91. In response to an AFOTEC initiative under the Defense Management Review (DMR) in 1989, the Air Force consolidated the RDT&E funding needed to support operational testing into a single program element (PE). Previously, funds to support IOT&E had to be provided from each acquisition program appropriation using complex accounting practices.³⁸

Developers. Air Force Systems, Communications, and Logistics Commands had long been responsible for developing new and modified systems. The often dismissive attitude toward AFOTEC by many within AFSC was a common theme running through much of the Center's first decade. In the late 1980s, a more cooperative atmosphere emerged, with AFOTEC emphasizing its role as an integral part of the acquisition process and opening new channels of communication with AFSC, which in 1989 dropped its traditional role as the advocate of new programs.

System Command's loss of major system responsibilities to the newly created program executive offices (PEOs) in early 1990, and the actions underway to merge AFSC and AFLC into the Air Force Materiel Command (AFMC) in 1992, portend sweeping changes for the Air Force acquisition community with which AFOTEC works.

In the testing arena, AFOTEC's close cooperation with DT&E field organizations has already been described. Chief among these are the Air Force Flight Test Center at Edwards AFB and the Air Force Development Test Center at Eglin AFB.

Informal Contacts. Many of AFOTEC's contributions to the other commands' OT&E programs as well as testing related aspects of acquisition programs take place informally at the action officer level as well as through representation on test planning working groups (TPWGs) and other bodies. When necessary, the directors, chief scientist, vice commander, and commander try to resolve more difficult issues through personal meetings and phone conversations with other officials. Sometimes AFOTEC can serve as an intermediary between developers, users, and higher headquarters on various issues. Although usually undocumented, the Center's informal contacts have represented an extensive part of AFOTEC's contributions to the Air Force.

OT&E at Air Force Headquarters

Even though AFOTEC has been influential in the development of policy related to OT&E, its main role has been implementing policies developed by higher headquarters, mainly by the Air Staff and the Secretariat.

The Operational Test & Evaluation Division of the Deputy Chief of Staff for Plans and Operations (AF/XOORE until a realignment in March 1990 redesignated it as XOOST) was for many years the office of primary responsibility for OT&E matters at the Air Staff. Headed by a colonel, this office served as AFOTEC's main focal point on the Air Staff. In February 1991, as part of a major reorganization of the Air Staff, the OT&E Division briefly became the Directorate for Operational Test and Evaluation (AF/XOT),

but in April it was decided to assign the OT&E office under the recently formed Directorate of Requirements (headed by a major general), and its office symbol became XORT.

In accordance with the influential report to the President by the Packard Commission in 1986, service acquisition executives (SAEs) were soon designated, including the Assistant Secretary of the Air Force for Acquisition (SAF/AQ). In early 1988 the Air Force created a Director for Test and Evaluation (SAF/AQV), which began to serve as a second testing focal point.

Although AFOTEC has worked closely with both of these offices, its commander continued to report directly to the CSAF. Merging the responsibilities of XORT and AQV into a new consolidated test and evaluation office (AF/TE) was under consideration in mid-1991.

OT&E in the Other Services

As with many other functions, each of the armed forces has developed its own approach to performing OT&E. They all, however, believe that the uniformed services should be responsible for operationally testing the weapons that they will have to fight with in combat.³⁹

Unlike the Air Force, which did away with its Air Proving Ground Command in 1957, the Navy has kept an operational testing organization intact since World War II. This organization became the DoD's first independent operational test agency (OTA) in 1971, one year before the Army established its counterpart. (As previously described, AFOTEC was formed in 1974.) The Marine Corps activated its OTA in 1978.⁴⁰ To coordinate policies and discuss issues of common concern, the four OTAs periodically hold conferences among their commanders and other key personnel.

Army. From September 1972 until November 1990, the Operational

Test and Evaluation Agency (OTEA) served as the Army's OTA. Headquartered first at Fort Belvoir, then at Falls Church, and finally at Alexandria, VA, OTEA managed OT&E as well as Continuous Comprehensive Evaluation (C²E). The latter system was designed to monitor the status of a system throughout the acquisition cycle. With approximately 320 authorized personnel, OTEA shared in the responsibility for actual field testing with the Training and Doctrine Command (TRADOC). OTEA prepared and/or coordinated independent evaluation plans (IEPs), test design plans (TDPs), and related documents with TRADOC--which was responsible for actual field testing.

For field testing, TRADOC relied mainly on its Test and Experimentation Command (TEXCOM) at Fort Hood, TX, the TEXCOM Experimentation Center (TEC) at Fort Hunter Liggett, CA, and a variety of test boards for the various branches: Infantry at Fort Benning, GA; Signal at Fort Gordon, GA; Armor/Engineer at Fort Knox, KY; Aviation at Fort Rucker, AL; Fire Support at Fort Sill, OK; Intelligence, and Communications/Electronics at Fort Huachuca, AZ; Air Defense Artillery at Fort Bliss, TX; and Airborne/ Special Forces at Fort Bragg, NC. These organizations prepared test reports, to which OTEA provided a written endorsement or a separate evaluation with conclusions.⁴¹

On 8 November 1990, the Army activated a new Operational Test and Evaluation Command (OPTEC). This implemented a DMR decision of 20 November 1989 to consolidate Army OT&E activities under a single command and allowed the Army to reduce the number of personnel involved with OT&E from approximately 2,700 to 2,000 positions.⁴²

In addition to its headquarters in Alexandria, OPTEC consists of several components: the Operational Evaluation Command (OEC), which includes many former OTEA functions at Alexandria; the OPTEC Threat Support Activity

(OTSA), formerly the Army Development and Acquisition Threat Simulators Activity (ADATS-A), at Fort Bliss, TX; and TEXCOM, formerly a subcommand of TRADOC.

TEXCOM continues to operate the TEC at Fort Hunter Liggett, but the Army replaced its traditional test boards with directorates. Four of the new directorates inherited board functions at other locations: Airborne/Special Forces at Fort Bragg, Fire Support at Fort Sill, Air Defense Artillery at Fort Bliss, and Intelligence/Electronic Warfare at Fort Huachuca. OPTEC also has T&E coordinating offices (TECOs) at several other branch or combat arms centers.

Among the key positions in Army OT&E are the evaluators at OEC and the test officers and test directors at TEXCOM. For major tests, a senior officer from the participating field command serves as the test director, with a TEXCOM officer as the deputy. In line with the reorganization, OPTEC has replaced IEPs and TDPs with single test and evaluation plans and may begin to publish consolidated test and evaluation reports during 1991. Through 1995 OPTEC projects the Army will be conducting approximately 400 OT&E programs.⁴³

Navy. Until the formation of OPTEC, the US Navy's Operational Test and Evaluation Force (OPTEVFOR) was the largest of the OTAs in terms of assigned personnel and test resources. In addition to about 300 people in the Norfolk headquarters and a deputate in San Diego, the commander (COMOPTEVFOR) controls over 1,000 personnel in three air test and evaluation squadrons (AIRTEVRONS): VX-1 with anti-submarine aircraft (e.g., P-3, S-3, SH-60) at Patuxent River, MD; VX-4 with fighters (F-4, F-14, F-18) at Point Mugu, CA; and VX-5 with attack aircraft (A-4, A-6, A-7, F/A-18, AV-8B, EA-6, and AH-1) at China Lake, CA.

OPTEVFOR relies on operational test directors (OTDs) to perform the

basic roles of both AFOTEC's test managers and test directors. For test execution, the OTDs normally deploy to the fleet and use operational personnel, similar to the manner in which AFOTEC uses MAJCOM resources.⁴⁴ Unlike in the Air Force, however, COMOPTEVFOR manages all OT&E programs, both large and small (completing 85 OT&E phases or assessments in 1989). OPTEVFOR also prepares related tactics guides and performs Chief of Naval Operations (CNO) projects--with an average of almost 900 of these underway during each of the past five years.⁴⁵

The Navy's IOT&E process is divided into OT-I, conducted prior to Milestone II if test articles are available, and OT-II, conducted prior to Milestone III, which is culminated by the operational evaluation (OPEVAL). The OPEVAL is conducted separately from and normally after the technical evaluation (TECHEVAL), which culminates DT&E. OT-III is FOT&E conducted after the OPEVAL, and OT-IV is FOT&E conducted later on production systems if necessary.⁴⁶

In addition to presenting results and overall conclusions as in AFOTEC final reports, the OPEVAL addresses how the test resolved each of the COIs, if the results support limited production, and COMOPTEVFOR's recommendation whether or not the system tested is ready for full or partial fleet introduction.⁴⁷

Marines. The Marine Corps Operational Test and Evaluation Activity (MCOTEA), a tenant organization with about 40 personnel at Quantico, VA, supports the material acquisition process by conducting operational tests of Marine Corps systems and equipment. Fleet Marine Forces support MCOTEA in executing tests and providing the data used by MCOTEA to prepare independent evaluation reports (IERs) for the Commandant of the Marine Corps. Both MCOTEA and

OPTEVFOR also use Marine Helicopter Squadron One (HMX-1) at Quantico for tests involving rotary wing aircraft. (HMX-1 is the unit that also flies the president and other key officials in the Washington DC area.)

Key Marine OT&E positions include operational test project officers (OTPOs) at MCOTEA (similar to AFOTEC's test managers) and test directors assigned to Fleet Marine Forces, who execute and report on the tests. Like AFOTEC, MCOTEA also monitors smaller OT&E programs performed by operational organizations. In 1991 MCOTEA is actively participating in more than 100 projects distributed among its three testing branches: Ground Combat, Aviation Combat, and Combat Service Support, with assistance from its Activity Support and Technical Support Branches.⁴⁸

DoD Oversight

Although the services conduct their own testing, the Office of the Secretary of Defense provides overall policy guidance, approves test plans, monitors progress, reports on results, and helps manage investments in test resources. Both acquisition and testing policies are spelled out in DoD's 5000 series of publications, which were thoroughly revised in February 1991. Their provisions reflect many of the recommendations made to the President by the influential Packard Commission in 1986.

The Director of Operational Test and Evaluation (DOT&E), mandated by Congress in 1983 and fully established as an OSD function in 1985, plays an influential role in the formulation of OT&E policy. (The abbreviation DOT&E refers to both the position and the organization.) As a member of the DAB, the director assures consideration of OT&E findings in program milestone decisions and is responsible for reporting directly to Congress on OT&E matters.⁴⁹

To do this, DOT&E exercises oversight responsibilities for major and selected non-major acquisition programs. Among other requirements, the services submit TEMP's for periodic OSD review, and DOT&E approves the OTAs' test plans. At the beginning of FY91, 49 Air Force weapons programs and eight programs under the purview of the Major Automated Information System Review Council (MAISRC) were on the DOT&E oversight list for OT&E, with two additional USAF weapons programs listed for DT&E only.⁵⁰

During the second half of the 1980s, DOT&E performed its oversight mission while pursuing a goal of consolidating T&E management and redefining development and operational testing. DOT&E also took the initiative in improving test resources throughout DoD. In the opinion of many within Congress, however, both of these objectives went beyond DOT&E's charter.⁵¹ With appointment of a new director in November 1989, DOT&E has somewhat changed its emphasis. Augmented more extensively by the Institute for Defense Analyses (IDA), DOT&E began in 1990 to more closely intercede with the OTAs in early test planning and to emphasize its preparation of independent evaluations using the services' test data.⁵²

Reflecting the dichotomy between operational and development test and evaluation, OSD responsibility for the latter belongs to the Under Secretary of Defense for Acquisition's Director of Defense Research and Engineering (DDR&E), who provides technical expertise, oversight, and support to all elements of the DoD acquisition system.⁵³ A deputy director for test and evaluation, abbreviated as DDDR&E(T&E), specializes in DT&E and JT&E as well as the management of test resources and investments. Assigned to this office is the Defense Evaluation Support Activity (DESA), most of which is located at Kirtland AFB.

Congressional Influence

Congressional interest in OT&E--which had helped lead to the establishment of independent OTAs in the early 1970s and compelled DoD to create DOT&E a decade later--has remained intense. Much of this interest is reflected in the numerous studies and investigations performed by the General Accounting Office (GAO) as well as frequent hearings and legislative actions.

A general theme in statements by the Congress's Military Reform Caucus and reports by the GAO has been a distrust of concurrent development, production, and testing strategies. They also seem to follow a philosophy that operational testing should have an adversarial relationship to the acquisition community and thereby help lead to cancellation of more programs. This reflects widespread support for a "fly-before-buy" approach. To many in Congress and OSD, operational testing should focus on demonstrations and force-on-force field exercises rather than sophisticated data gathering and analysis. The potential conflict of interest in using contractor support and data for OT&E has been a particular concern of Congress, which passed highly restrictive provisions against this practice in 1986.⁵⁴

Legislation passed in late 1989 expanded DOT&E's monitoring role by lowering the thresholds for certifying completion of OT&E to \$75 million in RDT&E or \$300 million in procurement, by requiring approval of test article quantities for major programs at Milestone II (thereby tightening LRIP quantities), and by extending DOT&E's

annual report to include a comparison of the TEMP versus actual test activities.⁵⁵ The new legislation did not alleviate the restrictions against use of contractor personnel and data that are making combined DT&E/IOT&E increasingly difficult.

How to continue doing intensive, analytical, yet efficient tests and evaluations of the performance of increasingly complex systems, and at the same time satisfy the political goals of Congress and policy objectives of OSD, will undoubtedly pose a continuing challenge to AFOTEC and the Air Force.

Conclusion

In its role as focal point for Air Force OT&E, AFOTEC has earned the reputation of a credible and cost-effective test agency with a clearly focused mission and a wide perspective on operational matters. Although encountering numerous challenges and limitations during its history, the soundness of AFOTEC's basic approach and the validity of its tests--despite the occasional concerns expressed by outside observers--seems to have been confirmed by the performance of USAF weapon systems in Operation Desert Storm.

It is hoped this paper has increased the reader's understanding of OT&E in general and the Air Force Operational Test and Evaluation Center in particular.

NOTES

Most sources listed in the end notes below are available at the AFOTEC Directorate of Research Services as supporting documents (SDs) to annual histories of AFOTEC, as documents in the OT&E Data Bank, or as part of the publications library. Only unclassified portions of the annual history are referenced in this paper. Information without specific citations are generally based on coverage in the history or the personal knowledge of the author.

1. AFR 23-36 (U), "Air Force Operational Test and Evaluation Center (AFOTEC)," 25 Mar 86, Supporting Document (SD) I-2 in Hist of AFOTEC, 1986. For a condensed mission description, see Fact Sheet 87-6, SAF/PA, "Air Force Operational Test and Evaluation Center," Jan 87, SD I-2 in 1987 history. For more recent information, see Point Paper (U), AFOTEC/XPX, "AFOTEC Responsibilities for Air Force OT&E," 29 Nov 89, pp 3-4 in AFOTEC Commander's Notebook (U), 30 Nov 89, SD I-2 in Hist of AFOTEC, 1989; and Brfg (U), AFOTEC/XPX, "AFOTEC Mission," as of Dec 90, SD I-2, Hist of AFOTEC, 1990. The Center's functions are described in detail by AFOTECR 23-1, "...Mission and Organizational Structures," 1 Aug 89, with Change 2, 23 Apr 90.
2. DoDD 5000.1 (U), "Defense Acquisition," 23 Feb 91, p I-8.
3. Ltr (U), DAF/PRQ 090r, "USAF Field Operating Agencies and Direct Reporting Units," 4 Feb 91.
4. US Code, Title 10, Section 138(a)(2), 21 Feb 90. (Derived from Public Law 98-94 as amended.)
5. For descriptions of test and assessment categories, see AFR 55-43 (U), "Management of Operational Test and Evaluation," 29 Jun 90, Chapter I, and DoDI 5000.2 (U), "Defense Acquisition Management Policies and Procedures," 23 Feb 91, Parts 8 and 15.
6. MOA (U) on Multiservice Operational Test and Evaluation (MOT&E) and Joint Test and Evaluation (JT&E), 10 Apr 90.
7. DoD 5000.3-M-4 (U), "Joint Test and Evaluation Procedures Manual," Aug 88.
8. Staff Summary (U), AFOTEC/XPX, "Demonstrations - What are they and how should AFOTEC handle them?," 30 Jan 90, w/atch point paper.
9. DoDI 5000.2 (U), "Defense Acquisition Program Procedures," 1 Sep 87, atch'd to SD I-32, Hist of AFOTEC, 1987; cf DoDI 5000.2, "Defense Acquisition Management Policies and Procedures," 23 Feb 91, Part 3.
10. DoDI 5000.2, Part 13; Memo (U), Don Yockey, Actg UndersecDef (Acq), "Revision of Defense Acquisition Board (DAB) Committee Charters," 1 May 91.
11. AFOTECR 55-1 (U), "AFOTEC Operations," 15 Jul 87 (SD I-4, Hist of AFOTEC, 1987) as updated by Ltr (U), AFOTEC/XP to Distr, "Interim Change 88-1 to AFOTECR 55-1, 9 Feb 88; AFOTECR 55-1: Change 1, 29 Apr 88, Change 2, 31 May 88, and Change 3, 8 Aug 88, consolidated as SD I-3 in 1988 history; and Change 4, 17 Mar 89, SD I-3 in 1989 history.

12. See above, note #5.
13. AFOTEC Sup 1 to AFR 55-43, 19 Apr 91.
14. AFOTEC Pamphlet 55-8 (U), "Planning and Programming Resources for Operational Test and Evaluation--Managed Programs," 13 Dec 90, describes the TPO.
15. For details on logistics assessments, see AFOTEC Pamphlet 400-1, "Operational Suitability Test and Evaluation," 15 May 91.
16. See AFOTECR 23-1 for details of AFOTEC's organizations and their functions.
17. AFR 55-43, Chaps 4 and 6, and AFOTEC Sup 1.
18. Technical Manual (U), TO-00-35D-54, "USAF Materiel Deficiency Reporting and Investigating System," 15 Mar 89 w/Change 2, 1 Aug 89.
19. See Study Report (S/NF), AFOTEC/RS, "Test Limitations: The Experience of the Air Force Operational Test and Evaluation Center (AFOTEC), 1974-1990," AFOTEC/SR-91-001, May 1991.
20. See Background Study (FOUO), AFOTEC/RS, "Development of the Electronic Combat Test Capability (ECTC) Program, 1984-1989," Jul 89.
21. Table 2 was inspired by a slide in the CTE Training Course.
22. See Dr Marion Williams, AFOTEC/CN, "Simulation in Operational Test and Evaluation," The ITEA Journal of Test and Evaluation, Vol X (1989), No.3, pp 33-36.
23. AFOTECR 55-1, Chaps 6 and 7
24. AFOTECR 210-1 (U), "Preservation of AFOTEC Information and Records," 2 Aug 90; AFOTECR 800-1 (U), "OT&E Lessons Learned Program," 1 Jan 88.
25. This account of the evolution of OT&E is distilled from the annual histories of AFOTEC and several dozen articles, reports, and papers collected by the author from the Air University Library, the USAF Historical Research Center, and the Defense Technical Information Center. To save space, they are not cited below unless quoted. The most comprehensive available study is "The Evolution of Policy Affecting Air Force Operational Test and Evaluation, 1909-1981" by Terrence R. StLouis, AFOTEC Hist Ofc, Sep 83. For a chronology covering both policy and test programs, see "An Illustrated History of AFOTEC, 1974-1989," Nov 89, available from AFOTEC/RS upon request.
26. As explained by Maj Gen Robert W. Burns, Cmdr of Air Proving Ground Center, in "Why the Air Proving Ground Center Is Changing Its Operation," Armed Forces Management, May 1958, pp 18-20.
27. Ltr (U), AF DCS/Programs & Resources, "USAF Decision Number D-73-81, Air Force Test and Evaluation Center (AFTEC), 11 Dec 73.
28. Authorized and assigned personnel statistics are recorded in an appendix to the annual AFOTEC histories. Additional personnel were last calculated in Background

Paper (U), AFOTEC/XPXP, "Number of Air Force People Directly Involved in OT&E," 18 Aug 89, SD I-4, Hist of AFOTEC, 1989.

29. AFOTECR 23-1 (U), Atch 1, pp 58-64; Special Orders on file in AFOTEC Histories.

30. Chapter I of annual AFOTEC histories provides details on policies and procedures.

31. AFR 55-43, pp 134-35; "1991 USAF Almanac Reports from the Major Commands," Air Force Magazine, pp 70-105.

32. Printouts (U), TRIMS Reports, 7 Jan 91, on file in OT&E Data Bank.

33. Point Paper (U), AFOTEC/XPX, "AFOTEC Responsibilities for Air Force OT&E," 29 Nov 89, p 3 in Cmdr's Notebook, SD I-2, Hist of AFOTEC, 1989.

34. AFR 57-1 (U), "Operational Needs, Requirements, and Concepts," effective 7 Oct 88, pp 15, 37.

35. See Hist of AFOTEC, 1987, pp 12-14, 1988, pp 12-17, 1989, pp 22-24.

36. Memorandum (U), Asst SecAF (Acq), "Requirements and Acquisition Program Reviews," 4 Apr 90.

37. For example, see Minutes (U) of OTA Commanders' Conference, 27 Apr 90.

38. Hist of AFOTEC, 1989, p 43.

39. Talking Paper (U), AFOTEC/XPX, "The Differences in the OTAs' OT&E Approaches," 2 Apr 90, SD I-9, Hist of AFOTEC, 1990.

40. Articles on each OTA in "A View of the Service Operational Test Agencies," ITEA Journal, XI (1988), No. 4, pp 16-25.

41. Ibid.; Paper (U), OTEA, "Evolution of the US Army Operational Test and Evaluation Agency," undated; Talking Paper (U), AFOTEC/XPX, "Army OT&E," 3 Apr 90; DA Pamphlet 71-3 (U), "Force Development: Operational Test and Evaluation Methodology and Procedures Guide," Dec 88.

42. Brfg (U), OTEA, "Army Operational Testing Reorganization," at OTA Commanders' Conference, 10-11 Apr 90; Msg (U), "Establishment of the US Army Test and Evaluation Command," retransmitted by E-Mail by AFOTEC/XPX, 29 Nov 90.

43. Grail L. Brookshire, "Tools of the Trade for Army Operational Testing," ITEA Journal, XII (1991), No. 1, pp 14-19; Memo (U), Dep Undersec Army (Oper Rsch), "AR 73-XX, Test and Evaluation Policy, and Revised DA Pamphlet 70-21, Test and Evaluation Guide," 6 Dec 90; Memo (U) Col Boyd A. Jones, CoS OPTEC, for AFOTEC/RS, "Coordination of Section on Army T&E for AFOTEC Publication," 28 May 91.

44. Instruction (U), COMOPTEVFORINST 3960.1F, "Operational Test Director Guide," 17 Apr 89, w/changes, 17 Apr 90.

45. Command History (C/OADR), COMOPTEVFOR, 1989, info used is unclassified.
46. OPNAVINST 3960.10C (U), "Test and Evaluation," 14 Sep 87, pp 5-8.
47. OTD Guide cited above, pp 2-16--2-25, 12-10.
48. Article in ITEA Journal cited above; Brfg (U), "MCOTEA," presented at OTA Cmdrs Conference, Nov 90; Ltr (U), Dir MCOTEA/A7C012, to AFOTEC/RS, "Coordination of Section on Marine OT&E for AFOTEC Publication," 23 May 91.
49. Talking Paper (U), Maj Deborah Gallo, AFOTEC/XPX, "DOT&E Reporting Requirements," 15 May 90, SD I-10, Hist AFOTEC, 1990.
50. Memo (U), Col Curtis Nelson, AFOTEC/XP, to TE et al., "1990 OSD Oversight List," 19 Nov 90, SD I-11.
51. DOT&E, annual reports (S) for FYs 86-90, info used is unclassified. See also Chapter I of AFOTEC histories for the same period.
52. Statement (U) of the Honorable Robert C. Duncan, DOT&E, Before the House Armed Services Committee, Subcommittee on Research and Development, 23 Apr 91.
53. DoDD 5000.1, p 3-3.
54. For details, see Chapter I in annual histories of AFOTEC starting in 1984.
55. United States Code Annotated, Feb 90, Pamphlet 6 (St Paul, MN: West Publishing Company), PL 101-189, Sections 801-03, pp 1483-88.

Appendix 1

COMMANDERS AND VICE COMMANDERS OF AFOTEC

Commanders:

Maj Gen John J. Burns	1 January - 25 August 1974
Maj Gen Richard G. Cross, Jr.	26 August 1974 - 31 August 1975
Col Stephen E. Moore	1 September 1975 - 9 November 1975
Maj Gen Robert A. Rushworth	10 November 1975 - 30 September 1976
Maj Gen Howard W. Leaf	1 October 1976 - 31 May 1980
Maj Gen Wayne E. Whitlatch	1 June 1980 - 26 May 1982
Maj Gen Richard W. Phillips, Jr.	27 May 1982 - 29 August 1985
Maj Gen Michael D. Hall	30 August 1985 - 30 June 1987
Maj Gen Cecil W. Powell	1 July 1987 - 18 January 1990
Maj Gen Peter D. Robinson	19 January 1990 - 18 July 1991
Maj Gen Marcus A. Anderson	19 July 1991 -

Vice Commanders:

Col Harold K. Wimberley	5 July 1974 - 31 August 1975
Col Stephen E. Moore	10 November 1975 - 31 April 1977
Col Hervey S. Stockman	1 May 1977 - 28 August 1977
Col Charles H. Hausenfleck	29 August 1977 - 1 November 1982
Col Paul N. Chase	6 January 1983 - 19 June 1984
Col Ralph F. Wetzl	20 June 1984 - 3 July 1985
Col Jon I. Lucas	3 July 1985 - 14 October 1987
Col Joseph E. Merrick	15 October 1987 - 28 June 1989
Col Robert A. Heston	29 June 1989 -

Appendix 2

SYSTEMS TESTED BY AFOTEC, 1974-1991

The following list shows various weapons and other systems tested and evaluated by AFOTEC and the inclusive dates of testing. Many of the entries cover multiple OT&E programs, with various tests (e.g., IOT&Es, FOT&Es, OUEs) performed during the time-spans indicated. It does not include operational assessments (OAs or EOAs) of systems still in development. Systems used in or deployed to Operation Desert Storm are indicated by an asterisk (*).

A-10 Thunderbolt II, 1974-77*	Anti-Satellite (ASAT) air-launched missile, 1983-88
A-10 LANTIRN, 1982-83	AQM-81A Firebolt, 1984-85
A-10 Operational Flight Trainer (OFT), 1980-82	Automated Data Processing System, 1979-83
Advanced Aerial Refueling Boom, 1977-78*	Automated Remote Tracking System (ARTS), 1988-89*
Advanced Airborne Command Post (E-4B), 1977-79	Automated Technical Control Program (ATEC), 1977-78
Advanced Medium Range Air-to-Air Missile (AMRAAM), 1981- *	B-1/B-1A, 1974-81
Advanced Synthetic Aperture Radar System (ASARS-2), 1982*	B-1B Lancer, 1984-91
AGM-65 Maverick (various models), 1974-85*	B-1B Weapon System Trainer, 1991-
AGM-86B Air Launched Cruise Missile (ALCM), 1979-81	B-52 (various models and systems), 1977-86*
AGM-88 High Speed Anti-Radiation Missile (HARM), 1979-87*	B-52 Weapon System Trainer (WST), 1981-84
AGM-109 ALCM, 1979-80	BGM-109 Ground Launched Cruise Missile (GLCM), 1982-84
AGM-122 SideARM, 1983-84	BQM-34F Target Drone, 1975
AGM-130, 1989-90	C-5A Galaxy, 1980-81*
AIM-7F/M Sparrow, 1975-82*	C-141B/YC-141B Starlifter, 1977-80*
AIM-9L/M Sidewinder, 1975-81*	CBU-89/B Gator, 1980-82*
AIM-120 - See AMRAAM*	Cobra Dane, 1976-77
Airborne Self Protection Jammer (ASPJ/ALQ-165), 1988-89	Common Strategic Rotary Launcher, 1985-86
Airborne Warning and Control System (AWACS/E-3A), 1974-82*	Communications Data Link Jammer (CDLJ), 1982
Air Force Satellite Communications (AFSATCOM), 1975-82*	Consolidated Space Operations Center (CSOC), 1989- *
AN/ALR-56M Radar Warning Receiver, 1988	Cruise Missile Defense, 1985-87
AN/ALR-74 Radar Warning Receiver, 1984-88	DSU-16/B Target Detector, 1976-77
AN/APR-38 (F-4G), 1986	Defense Support Program (various subsystems), 1978-86*
	E-3A - See AWACS*
	E-4B - See AACP

EF-111A Raven, 1977-82*
 EF-111A OBT, 1985-87
 F-4G Advanced Wild Weasel,
 1975-78*
 F-5E/F, 1975-76 (RSAF*)
 F-15 Eagle, 1975-77*
 F-15E Strike Eagle, 1988-90*
 F-16/YF-16 Falcon, 1974-90*
 F-16 OBT/WST, 1981-89
 GBU-15 Glide Bomb, 1983-87*
 GLCM - See BGM-109
 Ground Wave Emergency Network
 (GWEN), 1984-88
 HH-60 Combat Helicopter, 1984-86
 Joint Tactical Fusion, 1984
 Joint Tactical Information Distribution
 System (JTIDS), various compon-
 ents, 1978-89*
 Joint Surveillance and Target Attack
 System (JSTARS), 1990- *
 KC-10 Tanker, 1980-81*
 KC-135 WST, 1981
 KC-135R, 1982-84*
 Low Altitude Navigation and Target-
 ing Infrared for Night (LANTIRN),
 1982-87*
 Low Level Laser Guided Bomb
 (GBU-22/23), 1982-85*
 Milstar, 1984-
 Modular Control Equipment (MCE),
 1986-87*
 NATO Airborne Early Warning
 Ground Environment Integration
 Segment (NAEGIS), 1982-83
 Navstar Global Positioning System
 (Space, Control, and User Equip-
 ment Segments), 1980- *
 Next Generation Weather Radar
 (NEXRAD), 1986-89
 North Warning System, 1989
 Over-the-Horizon Backscatter (OTH-
 B) Radar, 1981-1991
 Pave Mover/Assault Breaker,
 1981-82
 Peacekeeper in Minuteman Silos,
 1982-89
 Piper Enforcer (PA-48), 1984
 Precision Location Strike System
 (PLSS), 1986-87

Remote Controlled Tactical Airborne
 SIGINT System, 1983-84
 Seek Comm, 1982
 Seek Talk, 1981
 Sensor Fuzed Weapon (SFW),
 1990-91
 Short-Range Attack Missile (SRAM)
 -II, 1990-91
 Space Defense Operations Center
 (SPADOC), 1986-87
 Space Transportation System (STS),
 various components, 1980-87
 Strategic Air Command Digital Info
 Network (SACDIN), 1984-86
 T-46A Next Generation Trainer,
 1985-87
 Tacit Rainbow (AGM-136), 1989-91
 Tactical Ground Intercept Facility II,
 1983-84
 TR-1 Tactical Reconnaissance Sys-
 tem, 1986*
 TRI-TAC (numerous components),
 1979-87*
 YC-14 Transport, 1976-77
 YC-15 Transport, 1975-77-
 YF-17 Lightweight Fighter, 1974-75

*Desert Storm

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

(Does not include weapon system designations identified in Appendix 1)

AF	Air Force	DOT&E	Director of Operational Test and Evaluation
AFCA	AF Communications Agency	DPA&E	Director Program Analysis and Evaluation
AFCC	AF Communications Command	DSARC	Defense System Acquisition Review Council
AFFTC	AF Flight Test Center	DSRD	Depot Support Requirements Document
AFM	AF Manual	DT&E	Development Test and Evaluation
AFMC	AF Materiel Command	DESA	Defense Evaluation Support Activity
AFOTEC	AF Operational Test and Evaluation Center	ECTC	Electronic Combat Test Capability
AFOTECR	AFOTEC Regulation	EOA	Early Operational Assessment
AFR	AF Regulation	ESC	Electronic Security Command
AFSARC	AF Systems Acquisition Review Council	FOT&E	Follow-on Operational Test and Evaluation
AFSC	AF Systems Command	FSD	Full Scale Development
AFSPACE-		GAO	General Accounting Office
COM	AF Space Command	IDA	Institute for Defense Analyses
APGC	Air Proving Ground Command	IEP	Independent Evaluation Plan
AQV	Director for T&E, Assistant SAF for Acquisition	IOC	Initial Operational Capability
ARDC	Air Research and Development Command	IOT&E	Initial Operational Test and Evaluation
ATC	Air Training Command	JRMET	Joint Reliability and Maintainability Evaluation Team
C ² E	Continuous Comprehensive Evaluation (Army)	JCS	Joint Chiefs of Staff
CNO	Chief of Naval Operations	JT&E	Joint Test and Evaluation
COEA	Cost & Operational Effectiveness Analysis	LFT	Live Fire Testing
COI	Critical Operational Issue	LG	Directorate of Logistics (AFOTEC)
CSC	Conventional Systems Committee	LRIP	Low Rate Initial Production
CTF	Combined Test Force	MAC	Military Airlift Command
CTEIP	Central Test & Evaluation Investment Program	MAISRC	Major Automated Information System Review Council
CR	Directorate of Test Capability (AFOTEC)	MAJCOM	Major Command
DAB	Defense Acquisition Board	MCOTEA	Marine Corps Operational Test and Evaluation Activity
DCS	Deputy Chief of Staff	MOA	Memorandum of Agreement
DDR&E	Director Defense Research and Engineering	MOE	Measure of Effectiveness
DDDR&E (T&E)	Deputy DDR&E for Test and Evaluation	MRTFB	Master Range and Test Facility Base
DEMVAL	Demonstration & Validation	MOT&E	Multiservice Operational Test & Evaluation
Det	Detachment		
DMR	Defense Management Review		
DoD	Department of Defense		

MST&E	Multiservice Test & Evaluation	SON	Statement of Operational Need
NORAD	North American Air Defense Command	SORD	System Operational Requirements Document
OA	Directorate of Analysis (AFOTEC)	SPO	Systems Program Office
OA	Operational Assessment	SSC	Strategic Systems Committee
OL	Operating Location	ST	Directorate of Special Test (AFOTEC)
OPEVAL	Operational Evaluation (Navy)	TAC	Tactical Air Command
OPTEC	Operational Test and Evaluation Command (Army)	TAF	Tactical Air Forces
OPTEVFOR	Operational Test and Evaluation Force (Navy)	TAWC	Tactical Air Warfare Center
ORD	Operational Requirements Document	T&E	Test and Evaluation
ORMAS	Operational Resources Management Assessment System	TE	Directorate of Test and Evaluation (AFOTEC)
OSC	OT&E Steering Committee	TECHEVAL	Technical Evaluation (Navy)
OSD	Office of the Secretary of Defense	TECO	Test & Evaluation Coordination Officer (Army)
OT	Operational Test	TEC	TEXCOM Experimentation Center
OTA	Operational Test Agency	TEMP	Test and Evaluation Master Plan
OT&E	Operational Test and Evaluation	TEXCOM	Test and Experimentation Command (OPTEC)
OTD	Operational Test Director (Navy)	TFWC	Tactical Fighter Weapons Center
OTEA	Operational Test and Evaluation Agency (Army)	TIC	Technical Integration Center
OTPO	Operational Test Project Officer (Marines)	TPO	Test Program Outline
OTO	Operational Test Organization (Space)	TPR	Test Plan Review
OTSA	OPTEC Threat Support Activity	TPWG	Test Planning Working Group
OUE	Operational Utility Evaluation	TRADOC	Training and Doctrine Command
PACAF	Pacific Air Forces	TSG	Test Support Group
PEO	Program Executive Office	USAFE	United States Air Forces in Europe
PMD	Program Management Directive	UTTR	Utah Test and Training Range
QOT&E	Qualification Operational Test and Evaluation	XP	Directorate of Plans and Policy (AFOTEC)
QT&E	Qualification Test and Evaluation	XOORE	
RCM	Requirements Correlation Matrix	XOOST	
R&D	Research and Development	XORT	OT&E Division (Air Staff)
RDT&E	Research, Development, Test and Evaluation		
RM	Directorate of Resource Management and Support (AFOTEC)		
RTO	Responsible Test Organization		
SAC	Strategic Air Command		
SAE	Service Acquisition Executive		
SAF	Secretary of the Air Force		
SAR	Selected Acquisition Report		
SAR	Special Access Required		
SMOTEC	Special Missions Operational Test and Evaluation Center		